

## Airborne Multi-Gas Sensor, Phase I

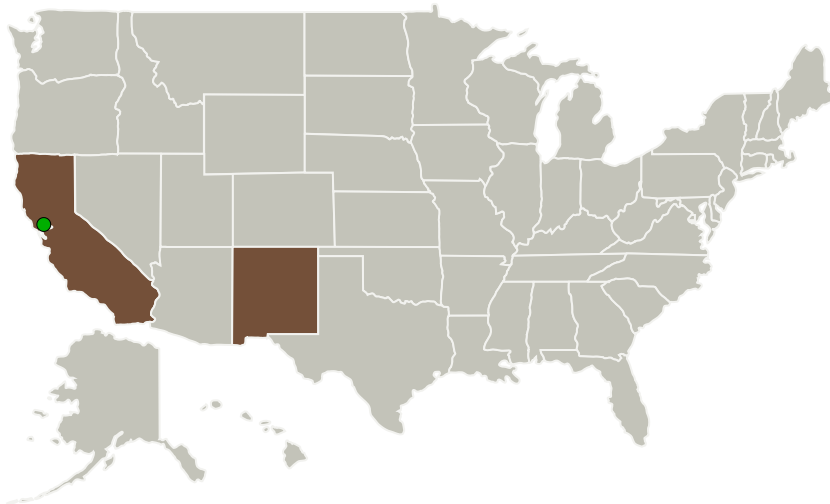
Completed Technology Project (2014 - 2014)



## Project Introduction

Mesa Photonics proposes to develop an Airborne Multi-Gas Sensor (AMUGS) based upon two-tone, frequency modulation spectroscopy (TT-FMS). Mesa Photonics has developed a fiber-coupled implementation of TT-FMS that leverages telecommunications lasers as sources and WiFi electronics for signal processing. With this approach, sensitive trace gas detection in a robust, compact and low-power package has been achieved. In work to-date, we have demonstrated the capability of this TT-FMS concept in a single channel. In the proposed project, we aim to demonstrate multiplexing of TT-FMS to provide simultaneous, real-time measurement of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>). In addition to demonstrating the extensibility of TT-FMS, the Phase I project would address key performance limitations encountered in early feasibility work. The objectives of Phase I are to: - Implement and test polarization management during phase modulation to reduce baseline variation induced by observed in previous work, - Build a two-channel TT-FMS with breadboard components, - Establish baseline (single-channel) performance of TT-FMS when polarization maintaining phase modulation is included, - Calibrate and evaluate the full AMGUS (two-channel, TT-FMS) apparatus. Accomplishment of Phase I objectives would yield a benchtop technology ready for transition to a UAV-compatible AMUGS prototype in Phase II.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Mesa Photonics, LLC

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

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Organizations Performing Work	Role	Type	Location
Mesa Photonics, LLC	Lead Organization	Industry	Santa Fe, New Mexico
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California	New Mexico
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## Project Transitions

**June 2014:** Project Start

**December 2014:** Closed out

**Closeout Summary:** Airborne Multi-Gas Sensor, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/140580>)

## Images

**Briefing Chart Image**

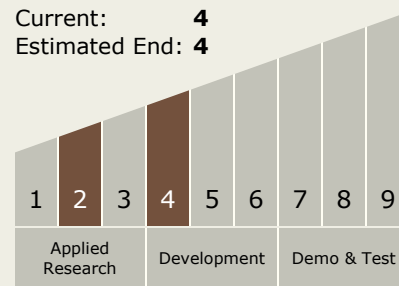
Airborne Multi-Gas Sensor, Phase I  
(<https://techport.nasa.gov/image/134593>)

Project Management  
(cont.)**Principal Investigator:**

Marwood Ediger

Technology Maturity  
(TRL)

Start: 2  
Current: 4  
Estimated End: 4



## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
  - TX08.1.5 Lasers

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System